Math 274 Quiz 6 **Name:** _____

Sections: Formulas Point values in $\boxed{\text{boxes}}$.

1 March 2019

Reduction of Order If $y_1(t)$ is a solution, not identically zero, to $y'' + p(t)y' + q(t)y = 0$ on I, then

$$y_2(t) = y_1(t) \int \frac{e^{-\int p(t)\,dt}}{(y_1(t))^2}\,dt$$

is a second, linearly independent solution.

1. $\boxed{6}$ For $x > 0$, find a general solution to

$$xy'' - y' + (1 - x)y = 0$$

provided that $y_1 = e^x$ is a solution.

Continued on the Reverse.

Variation of Parameters

If y_1 and y_2 are linearly independent solutions to $y'' + p(t)y' + q(t)y = 0$, then a particular solution to $y'' + p(t)y' + q(t)y = g(t)$ is given by

$$y_p(t) = y_1(t) \int \frac{-g(t)y_2(t)}{W[y_1, y_2](t)}\, dt + y_2(t) \int \frac{g(t)y_1(t)}{W[y_1, y_2](t)}\, dt.$$

2. $\boxed{4}$ Given that a general solution to the homogeneous equation

$$t^2y'' - 4ty' + 4y = 0.$$

is $y = C_1t^4 + C_2t$. Find a particular solution to

$$t^2y'' - 4ty' + 4y = f(t).$$

Express your solution as a reasonably simplified combination of integrals, i.e. evaluate the Wronskian and combine like terms. **Do not** try to integrate an unknown function.